REMARKS

Claims 1-37 are pending in the present application. Claims 11, 15, 17-19, 22, 25, 28, 29, 31 and 33 have been amended. Claim 37 is new. With respect to claims 17, 18, and 28, Applicants have amended the claims to recite "manifold segments" instead of "modular manifolds" only for the purpose of consistency with other claims and the specification. These terms are used interchangeably in the application, as filed. The specification has also been amended to correct typographical errors. In view of the foregoing amendments and the following remarks, Applicants respectfully submit that the application is in complete condition for allowance and request reconsideration in this regard.

Amendments to the Specification

As a preliminary matter, Applicants have amended the specification to correct two typographical errors. Applicants respectfully submit that these errors would have been readily apparent to one skilled in the art and, as a result, no new matter is being added by the corrections.

One of the typographical errors related to an incorrect reference numeral. The other related to the word "greater" being incorrectly used instead of "less." In regard to the latter error, it will be readily recognized that the word "less" should have been used to be consistent with the other disclosure. For example, the specification, as filed, stated:

> "liquid in the supply channel 20, and hence in the recirculation passageway 34, is maintained at a greater fluid pressure than the liquid in the recirculation outlet 58 (and, hence, supply and recirculation chambers 44, 46) of the dispensing module 14 up and until approximately the moment that valve element 54 achieves a contacting

> relationship with valve seat 48 to place the dispensing module 14 in the closed condition" (p. 14, lines 5-10).

This statement necessarily implies that fluid pressure in the supply and recirculation chambers 44, 46 is maintained less than that in the recirculation passageway 34. Applicants intended to explicitly state this principle in the sentence following the above quote. However, the next sentence, as filed, reads:

> In other words, the fluid pressure in the supply chamber 44 is maintained greater than the sum of the fluid pressure in the recirculation passageway 34 (and, hence, in supply channel 20) and the cracking pressure during the characteristic closing time required for the dispensing module to cycle from the open condition to the closed condition. (p. 14, lines 11-15)

The above sentence is clearly inconsistent with the statement that immediately precedes it. Those skilled in the art would have realized that the word "greater" should have been written as "less" not only from the preceding statement, but also from the sentence that immediately follows. The next sentence reads:

> As the valve element 54 approaches and contacts the valve seat 48, the fluid pressure builds in the supply and recirculation chambers 44, 46 until the fluid pressure of liquid in the recirculation outlet 58 exceeds the sum of the fluid pressure of liquid in the recirculation passageway 34 and the cracking pressure. (p. 14, lines 15-19)

The fluid pressure in the supply chamber 44 must "build" to exceed the sum of the fluid pressure in the recirculation passageway 34 and the cracking pressure because supply chamber 44 is maintained at a lower pressure until the valve element is closed. Other statements in the application also make this principle clear (e.g., see p. 15, lines 6-10).

For at least the above reasons, Applicants respectfully submit that the amendment to the paragraph beginning on page 14, line 11, does not add new matter

but merely corrects an inadvertent typographical error so as to be consistent with the rest of the original disclosure.

Claims 3, 4, 8, 12, and 15 under 35 U.S.C. § 112, first paragraph

Claims 3, 4, 8, 12, and 15 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. The Examiner alleges "[t]here is no disclosure in the specification of how the pressure of the liquid in the recirculation path could be greater than the pressure of the liquid in the dispensing path." Applicants respectfully disagree.

Claims 3, 4, and 8 depend from claim 1, which recites "a dispensing path in a manifold" and "a recirculation path in the manifold." The Examiner alleges that "[a]ccording to the specification the pressure in the dispensing path is always greater than the pressure in the recirculation path during operation of the pump." The specification does not describe the dispensing path in the manifold 12 as always having a greater pressure than the recirculation path in the manifold 12. Instead, the specification indicates that the pressure in the dispensing path in the manifold 12 is greater than the pressure in the recirculating path when the dispensing valve is in the closed condition, and less than the pressure in the recirculating path when the dispensing valve is in the open condition.

For example, with respect to the embodiment shown in Figs. 1-3, the dispensing path in the manifold 12 comprises the distribution passageway 32, which communicates liquid to the inlet 49 of the dispensing module 14 (see p. 13, lines 17-19 of the application). The dispensing path therefore supplies liquid to the recirculation

chambers 44, 46 and recirculation outlet 58 whenever the dispensing valve 94 is not in the fully open condition (see p. 12, line 23 – p. 13, line 3).

Meanwhile, the recirculation path in the manifold 12 comprises the recirculation passageway 34, which extends from the recirculation outlet 58 of the dispensing module 14 to a supply channel 20 in the manifold 12. The pressure within this recirculation path is "maintained at a greater fluid pressure than liquid in the recirculation outlet 58 (and, hence, supply and recirculation chambers 44, 46) of the dispensing module 14 up and until approximately the moment that valve element 54 achieves a contacting relationship with valve seat 48 to place the dispensing module 14 in the closed condition" (p. 14, lines 6-10). Because the dispensing path in the manifold 12 is in fluid communication with the supply and recirculation chambers 44, 46 (and, hence, recirculation outlet 58), the recirculation path in the manifold 12 maintains this same pressure relationship with the dispensing path. The pressure relationship prevents backflow from the recirculation path into the recirculation outlet 58 (and supply and recirculation chambers 44, 46) to help ensure that a predictable amount of liquid is dispensed onto a substrate when the dispensing valve cycles from the open condition to the closed condition (see p. 16, line 22 – p. 17, line 3).

In one embodiment, a check valve 80 is provided to help prevent backflow from the recirculation path to the dispensing module. The Examiner alleges "the check valve 80 would not operate as described and would close the recirculation path if the pressure in the recirculation path were greater than the pressure in the dispensing path." Indeed, the check valve 80 does close the recirculation path off from the

recirculation outlet 58 when the pressure in the recirculation path is greater than the pressure in the dispensing path (see discussion above).

The specification describes the check valve 80 as permitting "forward flow from recirculation outlet 58 to recirculation passageway 34 when the fluid pressure in recirculation outlet 58 exceeds the sum of the fluid pressure in the recirculation passageway 34 and the cracking pressure of check valve 80" (p. 15, lines 11-14). The valve "closes by fluid pressure to prevent return flow" (p. 15, lines 19-20). Thus, when the pressure in the recirculation path is greater than the pressure in the recirculation outlet 58 (and, hence, greater than the pressure of the dispensing path in the manifold 12), the check valve 80 prevents "backflow of liquid from the recirculation path to the dispensing module," as recited in claim 1.

For at least the above reasons, Applicants respectfully submit that the specification enables claims 3 and 8, which recite "maintaining a pressure of liquid in the recirculation path greater than a pressure of liquid in the dispensing path as the dispensing valve is cycled from the open condition to the closed condition." Claim 4 is similar to claim 3, but recites maintaining the pressure of liquid in the recirculation path greater than the pressure of liquid in the dispensing path "when the dispensing valve is in the open condition." These claims are consistent with the operation described above and in the application, namely that "liquid in the supply channel 20, and hence in the recirculation passageway 34, is maintained at a greater fluid pressure than liquid in the recirculation outlet 58 (and, hence, supply and recirculation chambers 44, 46) of the dispensing module 14 up and until approximately the moment that valve element 54

achieves a contacting relationship with valve seat 48 to place the dispensing module 14 in the closed condition."

Claims 12 and 15 include substantially the same recitations as claims 3 and 8, respectively, but depend from claim 11 instead of claim 1. Applicants have amended claim 11 to clarify the arrangement of the different flow paths. Amended claim 11, much like claim 1, recites a dispensing path and a recirculation path in manifold segments. The discussion above with respect to claims 3 and 8 applies equally to claims 12 and 15.

Therefore, for at least the reasons above, Applicants respectfully submit that claims 3, 4, 8, 12, and 15 satisfy the enablement requirement of 35 U.S.C. § 112 and request that the rejection of these claims be withdrawn.

Claims 1, 2, 5, 9, 10, 11, and 16 under 35 U.S.C. § 102(b) over Riney

Claims 1, 2, 5, 9, 10, 11, and 16 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Riney et al. (US 6,089,413). Applicants respectfully disagree.

For a reference to anticipate a claim, the "identical invention must be shown in as complete detail as is contained in the . . . claim." MPEP § 2131 (citing *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). To simplify matters, Applicants remarks will focus on independent claims 1 and 11. Both claims are directed to a method of applying liquid to a substrate and set forth pumping liquid through a dispensing path in a manifold (or manifold segments) to a dispensing module. A dispensing valve in the dispensing module is cycled between open and closed conditions to direct the liquid to the substrate or back to a recirculation path in the manifold. Claims 1 and 11 further recite "preventing backflow" of the liquid

"from the recirculation path to the dispensing module when the dispensing valve is cycling from the open condition to the closed condition." This step is neither shown nor suggested by Riney.

In particular, Riney discloses a liquid dispensing apparatus 10 including a distribution manifold 14 and a plurality of dispensing modules 12 mounted to the manifold 14. A dispensing valve 92 within each dispensing module cycles between open and closed conditions to direct liquid to a substrate or a recirculation path (see arrows in Fig. 2). Although a valve 94 contacts a seat 80 to close the recirculation path off from the chamber 44 within the dispensing module 12 when the dispensing valve 92 is in the open condition, nothing in Riney teaches or suggests preventing backflow from the recirculation path "when the dispensing valve is cycling" between the open and closed conditions. Indeed, Riney is typical of prior art dispensers (as acknowledged by Applicants on page 11, line 1 of the application) that are distinguished from claims 1 and 11. As the valve stem 82 moves the dispensing valve 92 from the fully open condition (Fig. 3) toward the closed condition (Fig. 2), the valve element 94 moves away from the seat 80. The space opened between the valve element 94 and seat 80 may allow liquid to from the recirculation path and into the chambers 44, 46 (via the recirculation outlet 58) before the dispensing valve 92 reaches the closed condition. This unintentional backflow may make the volumes of liquid dispensed unpredictable at high flow rates.

The inventions recited in claims 1 and 11 each address the above problem by preventing backflow during the cycling time of the dispensing valve (i.e., not merely when the valve is in the fully open condition). For at least this reason, Riney fails to

anticipate claims 1 and 11. Therefore, Applicants respectfully request that the rejection of claims 1 and 11 over Riney be withdrawn.

Claims 2, 5, 9, and 10 depend from claim 1, while claim 16 depends from claim 11. Accordingly Applicants respectfully submit that Riney fails to anticipate claims 2, 5, 9, 10, and 16 for at least the reasons above and request that the rejection of these claims be withdrawn as well.

Claims 6, 13, 17-20, 22, 23, 25, 26, and 28-32 under 35 U.S.C. § 103(a) over Riney in view of Akers

Claims 6, 13, 17-20, 22, 23, 25,[1] 26, and 28-32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Riney in view of Akers et al. (US 4,200,207). To establish a *prima facie* case of obviousness, "the prior art reference (or references when combined) must teach or suggest all the claim limitations." MPEP § 2143. Applicants respectfully submit that the Examiner has not established a *prima facie* case of obviousness for several reasons.

First, with respect to claims 6 and 13, Akers fails to cure the deficiency in Riney discussed above with respect to claims 1 and 11 (from which claims 6 and 13 respectively depend). For example, Akers merely discloses a pump 10 for supplying hot melt adhesive foam to a valved adhesive dispenser 26. The pump 10 includes a relief valve 9 for recycling all or part of an adhesive/gas solution through a recycle path 81 in the pump 10 in the event of pressure buildup within the dispenser 26 (see col. 7, lines 40-45). The recycle path 81 eventually communicates the solution back to a line 25 leading to the dispensing module 26 (see flow path arrows in Fig. 2). Thus, the relief

[1] The Examiner's rejection does not refer to claim 25, but lists claim 26 twice. Applicants have assumed that the Examiner intended to include claim 25 in this rejection based on statements by the Examiner elsewhere in the Official Action.

valve 9 does prevent backflow of liquid "from the recirculation path to the dispensing module," as recited in independent claims 1 and 11. Because the combination cited by the Examiner does not teach or suggest all of the recitations in independent claims 1 and 11, Applicants request that the rejection of dependent claims 6 and 13 be withdrawn.

Second, independent claim 17 is directed to an apparatus comprising a plurality of manifold segments and a plurality of dispensing modules. Each dispensing module includes a recirculation outlet in fluid communication with a recirculation passageway in a corresponding one of the manifold segments. Claim 25 is directed to a similar apparatus but recites a manifold with a plurality of recirculation passageways. Both claims 17 and 25 further recite each dispensing module including a check valve "positioned in said recirculation outlet." Being positioned in such a manner enables the check valves to prevent backflow from the recirculation passageway in each manifold segment to the interior of the dispensing modules.

The Examiner acknowledges that Riney does not disclose "a check valve positioned in the recirculation of outlet of each corresponding dispensing modules" and relies on the relief valve 9 in Akers to cure this deficiency. The relief valve in Akers, however, is positioned in a manifold block 30. Thus, combining the apparatus of Riney with the relief valve in Akers would not result in a check valve positioned in a recirculation outlet of a dispensing module. For at least this reason, Applicants respectfully submit that the Examiner has not established a *prima facie* case of obviousness and request that the rejection of claims 17 and 25 be withdrawn.

Claims 18, 19, and 22 are similar to claim 17 in various respects, but each recite check valves positioned in a different manner. For example, claim 18 recites "a plurality of check valves, one of each of said check valves positioned in [a] recirculation passageway of a corresponding one of [a] plurality of manifold segments." Applicants have amended claim 18 to further recite the check valves being "arranged to prevent backflow of the liquid from said recirculation passageway to a corresponding one of said plurality of dispensing modules." Although the relief valve 9 in Akers is positioned in a recycle flow path 81, the valve is not arranged to prevent backflow from the path 81 to the dispensing module 26 (see discussion above with respect to claims 6 and 13). As a result, Akers does not cure the deficiency in Riney acknowledged by the Examiner.

The same holds true for amended claims 19 and 22. Claim 19 recites a manifold having a recirculation passageway, a dispensing module having a recirculation outlet, and "a check valve positioned in at least one of said recirculation outlet and said recirculation passageway." The check valve is "arranged to prevent backflow of the liquid from said recirculation passageway to said dispensing module." Similarly, claim 22 recites "a plurality of check valves, one of each of said check valves positioned in a corresponding one of said recirculation passageways of said manifold and arranged to prevent backflow of the liquid from said recirculation passageway to a corresponding one of said plurality of dispensing modules." The relief valve 9 in Akers is not arranged to prevent such backflow, as discussed above. Therefore, Applicants respectfully submit that the combination of Riney in view of Akers fails to render amended claims 18, 19, and 22 obvious and request that the rejection of these claims be withdrawn.

Claims 20 and 23 depend from independent claims 19 and 22, respectively. Accordingly, Applicants respectfully submit that a *prima facie* case of obviousness has not been established for at least the reasons above and request that the rejection of claims 20 and 23 be withdrawn.

Claims 28, 29, and 31 all recite an apparatus having an adaptor plate. The adaptor plate includes a recirculation passageway coupling the recirculation passageway of a manifold with the recirculation outlet of a dispensing module (claim 29) or a plurality of such recirculation passageways (claims 28 and 31). Additionally, a check valve is positioned in each of the recirculation passageways of the adaptor plate. Being positioned in such a manner enables the check valve to prevent backflow of liquid from the corresponding recirculation passageway in the manifold to the interior of the corresponding dispensing module.

The Examiner has not indicated how Riney or Akers discloses an "adaptor plate" as recited in claims 28, 29, and 31. Even if such an adaptor plate were disclosed, however, the relief valve 9 in Akers does not cure the deficiency in Riney relating to a check valve. Specifically, the relief valve 9 in Akers is positioned in a manifold block 30, not in the recirculation passageway of "an adaptor plate" that couples a recirculation passageway of the manifold block 30 to a recirculation outlet of the dispensing module 26. For at least this reason, Applicants respectfully submit that the Examiner has not established a *prima facie* case of obviousness and request that the rejection of claims 28, 29, and 31 be withdrawn.

Claims 30 and 32 depend from independent claims 29 and 31, respectively. Accordingly, Applicants respectfully submit that the Riney-Akers

combination cited by the Examiner fails to render the invention of claims 29 and 31 obvious for at least the reasons above and request that the rejection of these claims be withdrawn.

Claims 7, 14, 21, 24, 27, and 33-35 under 35 U.S.C. § 103(a) over Riney in view of Akers and Leon

Claims 7, 14, 21, 24, 27, and 33-35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Riney in view of Akers as applied to claims 1, 11, 19, 22, 25, 28, 29, and 31 and further in view of Leon (US 5,523,682). As discussed above, neither Riney nor Akers discloses the recitation in independent claims 1 and 11 of "preventing backflow of liquid from [a] recirculation path to [a] dispensing module" or the recitations in independent claims 19, 22, and 25 relating to the position of a check valve. Claims 7, 14, 21, 24, and 27 depend from at least one of these claims, and nothing in Leon cures the deficiencies of the Riney-Akers combination. Accordingly, Applicants respectfully submit that the Examiner has not established a *prima facie* case of obviousness for at least the reasons above and request that the rejection of claims 7, 14, 21, 24, and 27 be withdrawn.

Claims 33-35 recite a method of applying liquid to a substrate. Of this group, claim 33 is the only independent claim. The Examiner's rejection is not clear as to which references were relied upon to obtain each step recited in claim 33. For example, claim 33 requires "sending a signal to a control coupled with the dispensing module indicating that the dispensing module is in the recirculating position." Applicants assume that the Examiner was relying upon Leon for the disclosure of such a step given that Riney and Akers are silent as to this aspect and the Examiner's statement that the "Riney-Akers combination shows all claimed features as discussed above except for

determining the position of the check valve."[2] Applicants respectfully submit that such a combination is based on the impermissible use of hindsight.

In addition to prior art references that teach all claim limitations, a *prima facie* case of obviousness requires a suggestion or motivation to combine the references to obtain the claimed invention. MPEP § 2143. "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." MPEP § 2143.01 (emphasis in original). The Examiner bears the initial burden to establish a *prima face* case of obviousness. "[I]mpermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art." MPEP § 2142 (emphasis added).

Here, neither Riney nor Akers teach or suggest "sending a signal to a control coupled with the dispensing module indicating that the dispensing modules is in the recirculating position," as recited by claim 33. Leon merely pertains to check valves in general and not the more specific problems associated with liquid dispensers and addressed by Applicants. As a result, a person having ordinary skill in the art would have had any reason to consider to Leon to obtain the method recited in claim 33. Because the Examiner has not established a *prima facie* case of obviousness, Applicants respectfully request that the rejection of claim 33 be withdrawn.

Claims 34 and 35 depend from claim 33. Accordingly, Applicants respectfully request that the rejection of these claims be withdrawn for at least the reasons above.

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[2] No "check valve" is recited in claims 33-35, although a "moveable valve element" is recited in claims 34 and 35.

Claim 36 under 35 U.S.C. § 103(a) over Riney in view of Akers, Leon, and Head

Claim 36 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Riney in view of Akers and Leon as applied to claim 33 and further in view of Head et al. (US 4,543,649). Once again, Applicants respectfully submit that there is no teaching, suggestion, or motivation to combine the references cited by the Examiner. Riney and Akers are silent as to the recitation in claim 33 regarding "sending a signal to a control coupled with the dispensing module." Head, like Leon, only contains a general disclosure about a type of sensor and does not relate to the problems addressed by Applicants. Therefore, one skilled in the art would not have been motivated to consider Leon or Head to obtain the invention recited in claim 33. Because claim 36 depends from claim 33, Applicants respectfully submit that the Examiner has not established a *prima facie* case of obviousness and request that the rejection be withdrawn.

New Claim

New claim 37 is directed to an apparatus for applying liquid to a substrate. The claim is similar to independent claim 19, but recites the recirculation passageway in the manifold and the recirculation outlet in the dispensing module "defining at least a portion of a recirculation path" extending to the supply channel in the manifold. Additionally, claim 37 further recites the check valve being "positioned in [the] recirculation path and configured to prevent backflow of the liquid within [the] recirculation path." Applicants respectfully submit that none of the references of record teach or suggest such an apparatus.

In particular, as acknowledged by the Examiner in the Official Action, Riney does not disclose a check valve. Additionally, as discussed above, the relief

valve in Akers is positioned in a recycle path that is located in the manifold and configured to communicate liquid back to a line leading to the dispensing module. Thus, Akers does not disclose a check valve "configured to prevent backflow" within a recirculation path at least partially defined by a recirculation passageway in the manifold and a recirculation outlet in the dispensing module. Accordingly, Applicants respectfully submit that claim 37 is also patentable over the art of record.

Conclusion

Applicants respectfully submit that the foregoing is a full and complete response to the Office Action mailed on November 2, 2006. Applicants also respectfully submit that the pending claims are patentable for the reasons discussed above. If the Examiner believes any matter requires further discussion, the Examiner is respectfully invited to telephone the undersigned attorney so that the matter may be promptly resolved.

Applicants believe that no fees are due in connection with this response. However, if such petition is due or any fees are necessary, the Commissioner may consider this to be a request for such and charge any necessary fees to deposit account 23-3000.

Respectfully submitted,
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